

**REMARKS**

The Applicants respectfully request reconsideration of the present Application in view of the reasons that follow.

Claims 1-36 are currently pending in this Application. A detailed listing of all claims that are, or were, in the Application, irrespective of whether the claim(s) remain under examination in the Application, is presented, with an appropriate defined status identifier.

**Claim Rejections – 35 U.S.C. § 102(b)**

In section 5 of the Office Action, claims 1-10 and 17 are rejected under 35 U.S.C. § 102(b) as being anticipated by Piety et al. (U.S. Patent 5,922,963). With regard to claims 1 and 3, the Applicants respectfully submit that Piety et al. fails to teach, disclose, or suggest all of the steps of claims 1 or all of the steps of claim 3 as combined therein. More specifically, Piety et al. does not teach, disclose, or suggest “estimating a data probability distribution based on data for the mechanical equipment” either alone or as included in the combination of steps of claim 1 or the combination of steps of claim 3.

The Office Action states that Piety et al. discloses “estimating a data probability distribution based on data for the mechanical equipment (a method for constructing an alarm limit envelope for machines having a statistically significant amount of historical vibration data available, see: col. 3, lines 28-30).” Piety et al., however, discloses only generally that “the processes of the current invention determine narrowband alarm limit envelopes which are constructed from the machine’s measured vibration spectra.” Col. 4, lines 33-36. Piety et al. makes no reference at all to estimating a data probability function. Nor does it teach, disclose, or suggest that any sort of data probability function is estimated for the statistically significant amount of historical vibration data available, or that the alarm limits are constructed from the statistically significant amounts of available historical vibration data using any sort of estimated data probability function. Thus Piety et al. does not teach, disclose, or suggest “estimating a data probability distribution based on data for the mechanical equipment” either alone or as included in the combination of steps of claim 1 or as included in the combination of steps of claim 3. Accordingly, the Applicants respectfully

request that the rejections of claims 1 and 3 under 35 U.S.C. § 102(b) be withdrawn. Additionally, claim 2 depends from claim 1 and is thus patentable over the cited combination of references for at least the same reasons as claim 1. Similarly, claims 4-10 and 17 depend from claim 3 are thus patentable over the cited combination of references for at least the same reasons as claim 3. Accordingly, the Applicants further request that the rejection of claims 2, 4-10, and 17 under 35 U.S.C. § 102(b) be withdrawn as well.

**Claim Rejections – 35 U.S.C. § 103(a)**

**a. Rejection of claims 11-13 based on Piety et al. in view of Henry et al.**

In section 6 of the Office Action, claims 11-13 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Piety et al. in view of Henry et al. (U.S. Patent No. 6,816,810). Claims 11-13 depend from claim 3. As stated above, Piety et al. fails to disclose the subject matter of claim 3. As to Henry et al., the Applicants respectfully submit that the Office Action fails to establish a *prima facie* case of obviousness with regard to claims 11-13 for at least the reason that there is no suggestion or motivation to modify Piety et al. or to otherwise combine the teachings of Piety et al. and Henry et al. to arrive at the subject matter of claims 11-13.

The Office Action correctly acknowledges that Piety et al. “does not disclose or suggest the data probability distribution is calculated using a kernel density method.” However, the Office Action further states with regard to claims 11-13 that “Henry discloses kernel density methods for statistical analyses, see: col. 5, lines 6-7,” and that it would have been obvious to combine the Kernel density methods of Henry et al. with Piety et al. because “these technologies are used to compare actual process behavior with expected normal behavior as predicted by the model and as indicated by historical data of stored statistical analyses thereby ensuring the reliability of obtained results and making the above combination very effective.” The Applicants respectfully disagree with the reasoning of the Office Action and the motivation cited therein for at least the following two reasons.

First, Piety et al. teaches away from the subject matter of claims 11-13, as well as combination with the teachings of Henry et al. Viewed as a whole, Piety et al. teaches utilizing basic heuristic shaping parameter multipliers, statistical means and/or standard deviations to determine the alarm limit envelope values without any acknowledged regard for or mention of an estimated data probability function for the available vibration data. In contrast, claims 11-13 recite the step of “estimating a data probability distribution based on data for the mechanical equipment” in combination with the step of “utilizing the data probability distribution to calculate the vibration amplitude limits.” The Applicants note in paragraph [0004] of their specification that estimating limits without regard for the probability distribution of the data, such as by simply calculating the average and standard deviation of the data, can result in erroneous limits because, for example, vibration data may not have a Gaussian probability distribution. Thus, by teaching the utilization of basic heuristic shaping parameter multipliers, statistical means and/or standard deviations to determine the alarm limit envelope values without any acknowledged regard for an estimated data probability function for the available vibration data, Piety et al. teaches away from the subject matter of claims 11-13.

The teachings of Piety et al. as to utilizing basic heuristic shaping parameter multipliers, statistical means and/or standard deviations to determine the alarm limit envelope values without regard for an estimated data probability function are also incompatible with estimating a data probability distribution “wherein the data probability distribution is calculated using a kernel density method” as additionally recited in claim 11 and included in claims 12-13 which depend from claim 11. This is because kernel density estimation methods are typically used for data having an unknown distribution and/or that does not follow a single type of distribution, and further do not require the use of simple statistical means or standard deviations to determine their limits. As such, using the basic heuristic shaping parameter multipliers, statistical means and/or standard deviations to determine the alarm limit envelope values as taught in Piety et al. in combination with the Kernel density methods of Henry et al. would produce erroneous limits rather than ensuring the reliability of obtained results and making the combination of Piety et al. and Henry et al. effective as suggested in the Office Action. Thus, Piety et al. when viewed as a whole teaches away from

estimating a data probability distribution “wherein the data probability distribution is calculated using a kernel density method” as recited in the combination of steps of claims 11-13, and also teaches away from combination with the Kernel density methods generally mentioned in Henry et al. Accordingly, one of ordinary skill in the art would not have been motivated to combine the teachings of Piety et al. and Henry et al. to somehow arrive at the subject matter of claims 11-13. See Manual of Patent Examining Procedure § 2141.02 and § 2145(X)(D)(2).

As to the second reason, the modification of Piety et al. to include the kernel density methods of Henry et al. as proposed in the Office Action would render Piety et al. unsuitable for its intended purpose of “easily and effectively developing accurate narrowband envelopes for identification of faults in rotating machinery” as stated in col. 2, lines 21-24. As stated above, using the basic heuristic shaping parameter multipliers, statistical means and/or standard deviations to determine the alarm limit envelope values as taught in Piety et al. in combination with the kernel density methods of Henry et al. would produce erroneous limits instead of accurate narrowband envelopes. Accordingly, one of ordinary skill in the art would not have been motivated to combine the teachings of Piety et al. and Henry et al. to somehow arrive at the subject matter of claims 11-13. See Manual of Patent Examining Procedure § 2143.01 and § 2145(III).

Thus, the combined teachings of Piety et al. and Henry et al. are not sufficient to render the subject matter of claims 11-13 prima facie obvious because there is no suggestion or motivation to modify Piety et al. or to otherwise combine the teachings of Piety et al. and Henry et al. to arrive at the subject matter of claims 11-13. Any suggestion or motivation to combine or otherwise modify the teachings of Piety et al. and Henry et al. has been taken from the Applicants’ own disclosure using hindsight, which is improper. Accordingly, the Applicants respectfully request that the rejection of claims 11-13 under 35 U.S.C. § 103(a) be withdrawn.

**b. Rejection of claims 18-22, 24-30, 32-33, and 35 based on Piety et al. in view of Henry et al. and further in view of Whiteside**

In section 7 of the Office Action, claims 18-22, 24-30, 32-33, and 35 are rejected under 35 U.S.C. § 103(a) as being unpatentable over Piety et al. in view of Henry et al. and further in view of Whiteside (U.S. Patent No. 6,816,810). Furthermore, the Applicants assume that claim 31, which depends from claim 30, is also rejected under 35 U.S.C. § 103(a) as being unpatentable over Piety et al. in view of Henry et al. and further in view of Whiteside.

**i. Claim 18**

Claim 18 depends from claim 3. As stated above, the subject matter of claim 3 is not taught, disclosed, or suggested by Piety et al. As to Henry et al., it is not properly combinable with Piety et al. for at least the reason that Piety et al. teaches away from the subject matter of claim 18. Viewed as a whole, Piety et al. teaches utilizing basic heuristic shaping parameter multipliers, statistical means and/or standard deviations to determine the alarm limit envelope values without any acknowledged regard for or mention of an estimated data probability function for the available vibration data. In contrast, claim 18 recites by way of claim 3 the step of “estimating a data probability distribution based on data for the mechanical equipment” in combination with the step of “utilizing the data probability distribution to calculate the vibration amplitude limits.” The Applicants note in paragraph [0004] of their specification that estimating limits without regard for the probability distribution of the data, such as by simply calculating the average and standard deviation of the data, can result in erroneous limits because, for example, vibration data may not have a Gaussian probability distribution. Thus, by teaching the utilization of basic heuristic shaping parameter multipliers, statistical means and/or standard deviations to determine the alarm limit envelope values without any acknowledged regard for an estimated data probability function for the available vibration data, Piety et al. teaches away from the subject matter of claim 18. As to Whiteside, it fails to make up for any of the above-mentioned deficiencies in the combination of Piety et al. in view of Henry et al. with regard to claim 3. Thus, claim 18 is patentable over the cited combination of Piety et al. in view of Henry et al. and further in view of Whiteside

for at least the same reasons as claim 3. Accordingly, the Applicants request that the rejection of claim 18 under 35 U.S.C. § 103(a) be withdrawn.

**ii. Claims 19-22 and 24-29**

The Applicants respectfully submit that the cited combination of Piety et al. in view of Henry et al. and further in view of Whiteside fails to teach, disclose, or suggest all of the steps of claim 19 as combined therein. More specifically, the cited combination of Piety et al. in view of Henry et al. and further in view of Whiteside does not teach, disclose, or suggest “weighting the historical data based on when the historical data was generated” either alone or as included in the combination of steps of claim 19. The Office Action states that claim 19 is “rejected for the reasons set forth in paragraphs 5 and 6.” However, the Applicants respectfully submit that the reasons set forth in paragraphs 5 and 6 of the Office Action with regard to claims 1-13 and 17 fail to address the step of “weighting the historical data based on when the historical data was generated” either alone or as included in the combination of steps of claim 19. Nowhere in any of Piety et al., Henry et al. and Whiteside is this step suggested, and particularly not as part of a “method for detecting faults in a chiller based on vibration amplitude limits” when combined with the other steps of claim 19. Thus, the cited combination of Piety et al. in view of Henry et al. and further in view of Whiteside fails to teach, disclose, or suggest all of the steps of claim 19 as combined therein. Accordingly, the Applicants respectfully request that the rejection of claim 19 under 35 U.S.C. § 103(a) be withdrawn. Additionally, claims 20-22 and 24-29 depend from claim 19 and are thus patentable over the cited combination of references for at least the same reasons as claim 19. Accordingly, the Applicants further request that the rejection of claims 20-22 and 24-29 under 35 U.S.C. § 103(a) be withdrawn as well.

**iii. Claims 30-33, and 35**

The Applicants respectfully submit that the cited combination of Piety et al. in view of Henry et al. and further in view of Whiteside fails to teach, disclose, or suggest all of the steps of claim 30 as combined therein. More specifically, the cited combination of Piety et al. in view of Henry et al. and further in view of Whiteside does not teach, disclose, or suggest “identifying the individual spectrum with a smallest number of frequency lines” or “calculating noise bandwidths and a largest noise bandwidth” either alone or as included in the combination of steps of claim 30. The Office Action states that claim 19 is “rejected for the reasons set forth in paragraphs 5 and 6.” However, the Applicants respectfully submit that the reasons set forth in paragraphs 5 and 6 of the Office Action with regard to claims 1-13 and 17 fail to address the steps of “identifying the individual spectrum with a smallest number of frequency lines” and “calculating noise bandwidths and a largest noise bandwidth” either alone or as included in the combination of steps of claim 30. Nowhere in any of Piety et al., Henry et al. and Whiteside is this step suggested, and particularly not as part of a “method for determining vibration amplitude limits of a mechanical device” when combined with the other steps of claim 30. Thus, the cited combination of Piety et al. in view of Henry et al. and further in view of Whiteside fails to teach, disclose, or suggest all of the steps of claim 30 as combined therein. Accordingly, the Applicants respectfully request that the rejection of claim 30 under 35 U.S.C. § 103(a) be withdrawn. Additionally, claims 31-33 and 35 depend from claim 30 and are thus patentable over the cited combination of references for at least the same reasons as claim 30. Accordingly, the Applicants further request that the rejection of claims 31-33 and 35 under 35 U.S.C. § 103(a) be withdrawn as well.

**Allowable Subject Matter**

In section 8 of the Office Action, claims 14-16, 23, 34, and 36 are indicated as being allowable except for an objection to their dependency on a rejected base claim. Claims 14-16 depend from claim 3. Claim 23 depends from claim 19. Claims 34 and 36 depend from claim 30. As stated above, the subject matter of claims 3, 19, and 30 is not taught, disclosed, or suggested by the cited references. Thus, claims 14-16 in their current form are patentable for at least the same reasons as claim 3, claim 23 in its current form is patentable for at least the same reasons as claim 19, and claims 34 and 36 in their current form are patentable for at least the same reasons as claim 30. Accordingly, the Applicants respectfully request that the objections to claims 14-16, 23, 34, and 36 be withdrawn.

**Conclusion**

The Applicants believe that the present Application is now in condition for allowance. Favorable reconsideration of the Application as amended is respectfully requested.

The Examiner is invited to contact the undersigned by telephone if it is felt that a telephone interview would advance the prosecution of the present Application.



The Commissioner is hereby authorized to charge any additional fees which may be required regarding this Application under 37 C.F.R. §§ 1.16-1.17, or credit any overpayment, to Deposit Account No. 06-1447. Should no proper payment be enclosed herewith, as by a check being in the wrong amount, unsigned, post-dated, otherwise improper or informal or even entirely missing, the Commissioner is authorized to charge the unpaid amount to Deposit Account No. 06-1447. If any extensions of time are needed for timely acceptance of papers submitted herewith, the Applicants hereby petition for such extension under 37 C.F.R. § 1.136 and authorizes payment of any such extensions fees to Deposit Account No. 06-1447.

Respectfully submitted,

Date 11/22/2005

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